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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/036,979	12/31/2001	Debargha Mukherjee	10006292-1	5324

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10/08/2003

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, CO 80527-2400

EXAMINER

LAROSE, COLIN M

ART UNIT	PAPER NUMBER
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2623

DATE MAILED: 10/08/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/036,979

Applicant(s)

MUKHERJEE ET AL.

Examiner

Colin M. LaRose

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5,6,8-10 and 13-19 is/are rejected.
- 7) ☒ Claim(s) 4,7,11,12, and 20 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4,5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-3 and 14-17 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,373,981 by de Queiroz et al. (“de Queiroz ‘981”).

[de Queiroz incorporates by reference U.S. Patent 6,334,001 by de Queiroz et al. (“de Queiroz ‘001”). See column 3, lines 45-50 and column 4, lines 7-8.]

Regarding claim 1, de Queiroz ‘981 discloses a method of decomposing an image comprising the steps of:

- a) decomposing the image into a plurality of stripes (column 1, lines 63-66: image is segmented into strips comprised of blocks);
- b) decomposing each stripe into foreground and background image layers, and a mask layer (figure 1: image is separated into three layers; and de Queiroz ‘001 discloses plane 14 is background , plane 12 is foreground, and plane 16 is a mask (column 5, lines 31-40));
- c) interpolating irrelevant pixel values in the foreground and background layers for coder efficiency (de Queiroz ‘001, column 9, lines 41-55: irrelevant pixels (N’s) are interpolated (i.e. replaced)).

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Regarding claim 2, de Queiroz '001 discloses

d) encoding the foreground, background, and mask layers (110, 112, 114, figure 2).

Regarding claim 3, de Queiroz '981 discloses the foreground and background are JPEG encoded, wherein the mask is JBIG encoded (column 5, line 57 through column 6, line 3).

Regarding claim 14, de Queiroz '981 discloses a method of decomposing an image comprising the steps of:

a) decomposing the image into a plurality of stripes (column 1, lines 63-66: image is segmented into strips comprised of blocks);

b) decomposing each stripe into foreground and background image layers, and a mask layer (figure 1: image is separated into three layers; and de Queiroz '001 discloses plane 14 is background, plane 12 is foreground, and plane 16 is a mask (column 5, lines 31-40));

c) identifying an area of intersection of a common reduced foreground area and a common reduced background area (figure 5: blocks containing edges are areas that include an intersection of foreground and background areas, which are common to (i.e. both contained in) the intersection area; also, the background and foreground areas are at a reduced resolution (column 5, lines 50-52)); and

c) interpolating irrelevant pixel values within the area of intersection for coder efficiency (column 7, lines 58-67: irrelevant pixels (N's) in the areas (blocks) of intersection are interpolated (i.e. they are given substitute values)).

Regarding claim 15, de Queiroz '981 discloses that the area of intersection (i.e. a block labeled as "edge") is selected to have an edge that is $8N$ pixels from at least one of an edge of the common reduced foreground area and the common reduced background area, wherein N is 0 (in

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a block having an “edge”, there is a boundary (edge) between the foreground area (Y’s) and the background area (N’s); since the boundary divides the block by foreground/background areas, the boundary is zero pixels from each of those areas).

Regarding claim 16, de Queiroz ‘981 discloses the interpolating step comprises;

- i) selecting a block of pixels (210, figure 3); and
- ii) classifying each pixel within the selected block as irrelevant or relevant (230, figure 3).

Regarding claim 17, de Queiroz ‘001 discloses interpolating further comprises:

- iii) calculating an average value of any relevant (“Y”) pixels within the selected block;
- and
- iv) assigning the average value to all irrelevant (“N”) pixels within the selected block (802, figure 8, and column 10, lines 1-3: the N pixels are replaced by the average of the Y pixels).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

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evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 5, 6, 8-10, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over de Queiroz '981 and "On Data Filling algorithms for MRC Layers" by de Queiroz ("Data Filling").

Regarding claim 5, de Queiroz '001 discloses the interpolating step c) further comprises the steps:

- i) classifying each pixel within a selected block of a selected layer as relevant or irrelevant (figure 4: Y = relevant pixels, N = irrelevant pixels);
- ii) generating a coefficient block representing a forward transform of the selected block (804, figure 9);
- iii) modifying coefficient values to generate a modified coefficient block (804: quantize coefficients and 806: remove some coefficients) subject to a set of predetermined constraints (812: the condition(s) to stop modifying the coefficients).

de Queiroz '001 discloses that the pre-determined constraints include comparing the relevant pixels in consecutive blocks and discontinuing the iterations if "a designated criteria is met" or "a designated amount of improvement or change has occurred" (column 10, lines 34-44).

Thus, de Queiroz '001 does not expressly disclose the constraint is that the "relevant pixels have a same value in an inverse transformation of the modified block as in the selected block.

“Data Filling” is a paper by de Queiroz that discloses the same iterative modification of DCT coefficients for each block. In particular, “Data Filling” discloses that the constraint for modifying the DCT coefficients is “convergence”, wherein convergence is achieved when successive relevant pixels are identical (see Section 4.2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify de Queiroz ‘001 so that the constraint for modifying the coefficients is that the relevant pixel have a same value as claimed, since “Data Filling” teaches that using the claimed stopping criteria achieves superior results.

Regarding claim 6, de Queiroz ‘001 discloses step c) iii) includes:

a) selecting a coefficient from the coefficient block in a reverse zig-zag order wherein the selected coefficient has a non-zero value (806, figure 9: high frequency coefficients are selected (and removed), according to the zig-zag order shown in figure 10); and

b) finding a feasible solution resulting in a zero quantizable selected coefficient subject to the predetermined constraints (812, figure 9: a feasible solution is reached when the stopping criteria is met (i.e. convergence is achieved, per “Data Filling”); and the solution contains coefficients quantized to zero (i.e. removed)).

Regarding claim 8, de Queiroz ‘001 discloses values of individual elements of a mask classify pixels in corresponding positions within the selected block as relevant or irrelevant (figure 3: pixels values in mask (selector plane) determine the relevance of pixels in the upper and lower planes, as shown in figure 4).

Regarding claim 9, de Queiroz ‘001 discloses the step of :

d) providing the modified coefficient block to a block compression process (figure 9: modified coefficient block from 804 is sent to a block compression stage (806) to remove high frequency coefficients).

Regarding claim 10, de Queiroz '001 discloses step c) further comprises the step of applying a linear program to identify a feasible solution resulting in a zero-quantizable coefficient subject to the constraints (812, figure 9: a linear inequality function ("program") is applied to determine if the current pixels are sufficiently close to the original pixels).

Regarding claim 13, de Queiroz '001 discloses that the forward transform is discrete cosine (804, figure 9).

6. Claims 18 and 19 rejected under 35 U.S.C. 103(a) as being unpatentable over de Queiroz '981.

Regarding claim 18, de Queiroz '981 discloses step c) further comprises:

i) computing a variance for a selected block of the area of intersection (310, figure 4; and figure 6);

ii) dividing pixels within the selected block into a plurality of groups (column 9, lines 2-4: pixels are divided into "dark" and "bright" groups); and

ii) assigning each selected group to one of the foreground and background planes in accordance with a relative average luminance value of the selected group and another group, if the variance exceeds a predetermined threshold (figure 7 and column 9, lines 41-50: if the block variance (d) is greater than x_2 , then the block is classified as an "edge" and flow continues to step 420, figure 5, wherein the pixels of each group (bright/dark) are assigned to either the b.g. or f.g.

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planes; thus, the assignment is carried out in accordance with the variance d , which is based on a relative average luminance value of the selected group (e.g. 540, figure 6: average for the group of bright pixels) and another group (550, figure 6: average for the group of dark pixels).

de Queiroz '981 uses a statistical measure of variance rather than simply the maximum block range, as is claimed. However, de Queiroz '981's variance is thought to be substantially equivalent to the claimed "maximum block range" since both calculations are essentially used as a measure of the variations of pixel values in the block.

Regarding claim 19, de Queiroz '981 discloses step c)(iii) further comprises the step of assigning the selected group to the background layer and the other group to the foreground layer if an average luminance of the selected group is greater than an average luminance of the other group, wherein the selected group is assigned to the foreground layer and the other group to the background layer if the average luminance of the selected group is not greater than the average luminance of the other group (420, figure 5: the "dark" group is assigned to the foreground plane, and the "bright" group is assigned to the background plane; the average luminance of the dark group is inherently less than the average luminance of the light group).

Allowable Subject Matter

7. Claims 4, 7, 11, 12, and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Conclusion

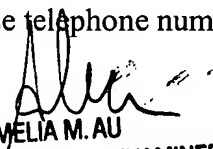
8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 6,324,305 by Holladay et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colin M. LaRose whose telephone number is (703) 306-3489. The examiner can normally be reached Monday through Thursday from 8:00 to 5:30. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au, can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2600 Customer Service Office whose telephone number is (703) 306-0377.


AMELIA M. AU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

CML

Group Art Unit 2623

26 September 2003